

CLAIMS

WHAT IS CLAIMED:

1. A targeted lipid particle, comprising:
 - (a) a lipid bilayer enclosing a lumen,
 - (b) a henipavirus F protein molecule or biologically active portion thereof; and
 - (c) a targeted envelope protein comprising (i) a henipavirus envelope attachment glycoprotein G (G protein) or a biologically active portion thereof and (ii) single domain antibody (sdAb) variable domain, wherein the sdAb variable domain is attached to the C-terminus of the G protein or the biologically active portion thereof and/or wherein the sdAb is attached to the G protein or the biologically active portion thereof via a peptide linker, wherein the sdAb binds to a cell surface molecule of a target cell,
wherein the F protein molecule or the biologically active portion thereof and the targeted envelope protein are embedded in the lipid bilayer.
2. The targeted lipid particle of claim 1, wherein the cell surface molecule is a protein, glycan, lipid or low molecular weight molecule.
3. The targeted lipid particle of claim 1 or claim 2, wherein the target cell is selected from the group consisting of tumor-infiltrating lymphocytes, T cells, neoplastic or tumor cells, virus-infected cells, stem cells, central nervous system (CNS) cells, haematopoietic stem cells (HSCs), liver cells, and/or fully differentiated cells.
4. The targeted lipid particle of any of claims 1-3, wherein the target cell is selected from the group consisting of a CD3+ T cell, a CD4+ T cell, a CD8+ T cell, a hepatocyte, a haematopoietic stem cell, a CD34+ haematopoietic stem cell, a CD105+ haematopoietic stem cell, a CD117+ haematopoietic stem cell, a CD105+ endothelial cell, a B cell, a CD20+ B cell, a CD19+ B cell, a cancer cell, a CD133+ cancer cell, an EpCAM+ cancer cell, a CD19+ cancer cell, a Her2/Neu+ cancer cell, a GluA2+ neuron, a GluA4+ neuron, a NKG2D+ natural killer cell, a SLC1A3+ astrocyte, a SLC7A10+ adipocyte, or a CD30+ lung epithelial cell.
5. The targeted lipid particle of any of claims 1-4, wherein the single domain antibody binds to an antigen or portion thereof present on a hepatocyte; and/or the cell surface molecule or antigen is selected from the group consisting of ASGR1, ASGR2 and TM4SF.

~~6. The targeted lipid particle of any of claims 1-5, wherein the cell surface molecule or antigen is selected from the group consisting of ASGR1, ASGR2 and TM4SF.~~

67. The targeted lipid particle of any of claims 1-4, wherein the single domain antibody binds to an antigen or portion thereof present on a T cell; and/or the cell surface molecule or antigen is CD8 or CD4.

~~8. The targeted lipid particle of any of claims 1-4 and 7, wherein the cell surface molecule or antigen is CD8 or CD4.~~

79. The targeted lipid particle of any of claims 1-4, wherein the cell surface molecule or antigen is LDL-R.

810. A targeted lipid particle, comprising:
(a) a lipid bilayer enclosing a lumen,
(b) a henipavirus F protein molecule or biologically active portion thereof; and
(c) a targeted envelope protein comprising (i) a henipavirus envelope attachment glycoprotein G (G protein) or a biologically active portion thereof and (ii) a binding domain, wherein the binding domain is attached to the C-terminus of the G protein or the biologically active portion thereof, and wherein the binding domain binds a cell surface molecule selected from the group consisting of ASGR1, ASGR2, TM4SF5, CD8, CD4, and low density lipoprotein receptor (LDL-R),

wherein the F protein molecule or the biologically active portion thereof and the targeted envelope protein are embedded in the lipid bilayer.

~~11. The targeted lipid particle of claim 10, wherein the binding domain is attached to the G protein via a linker.~~

~~12. The targeted lipid particle of claim 11, wherein the linker is a peptide linker.~~

913. The targeted lipid particle of any of claims 1-~~812~~, wherein the lipid particle is a lentiviral vector.

1014. A lentiviral vector, comprising:

(a) a henipavirus F protein molecule or biologically active portion thereof; and

(b) a targeted envelope protein comprising (i) a henipavirus envelope attachment glycoprotein G (G protein) or a biologically active portion thereof and (ii) a binding domain, wherein the binding domain is attached to the C-terminus of the G protein or the biologically active portion thereof, and wherein the binding domain binds CD4; and

(c) a cargo comprising nucleic acid encoding a chimeric antigen receptor (CAR), wherein the CAR comprises (i) an extracellular antigen binding domain that binds CD19, ~~optionally wherein the extracellular antigen binding domain is an scFv~~, (ii) a transmembrane domain and (iii) an intracellular signaling region comprising a CD3zeta signaling domain.

~~15. The lentiviral vector of claim 14, wherein the intracellular signaling region of the CAR further comprises a 4-1BB co-stimulatory signaling domain.~~

~~16. The lentiviral vector of claim 14 or claim 15, wherein the lentiviral vector is capable of delivering the nucleic acid encoding the CAR to T cells, optionally wherein the T cells are in vivo in a subject~~

1117. A lentiviral vector, comprising:

(a) a henipavirus F protein molecule or biologically active portion thereof; and
(b) a targeted envelope protein comprising (i) a henipavirus envelope attachment glycoprotein G (G protein) or a biologically active portion thereof and (ii) a binding domain, wherein the binding domain is attached to the C-terminus of the G protein or the biologically active portion thereof, and wherein the binding domain binds a cell surface molecule selected from the group consisting of ASGR1, ASGR2 and TM4SF5.

~~18. The lentiviral vector of claim 17, wherein the lentiviral vector is capable of targeting hepatocytes.~~

~~19. The lentiviral vector of claim 17 and claim 18, further comprising an exogenous agent for delivery to hepatocytes and/or wherein the lentiviral vector is capable of delivering the exogenous agent to hepatocytes, optionally wherein the hepatocytes are in vivo in a subject.~~

1220. The targeted lipid particle of claim 8 or claim 9 or the lentiviral vector of ~~any of claim 10 or claim 11~~ claims 14-19, wherein the binding domain is attached to the G protein via a linker, ~~optionally wherein the linker is a peptide linker.~~

13. The targeted lipid particle or the lentiviral vector of claim 12, wherein the linker is a peptide linker.

1421. The targeted lipid particle of any of claims 8, 9, 12, and 13~~10-13~~ or the lentiviral vector of any of claims 1014-1320, wherein the binding domain is a single domain antibody or is a single chain variable fragment (scFv).

1522. The targeted lipid particle of any of claims 1-7, 13, and 14~~1-9, 12, and 13~~ or the lentiviral vector of claim 13 or claim 1420 or claim 21, wherein the peptide linker comprises up to 65 amino acids in length,~~optionally 2 to 65 amino acids in length.~~

1623. The targeted lipid particle of any of claims 1-7 and 13~~1-9, 12, 13 and 22~~ or the lentiviral vector of any of claims 1320-1522, wherein the peptide linker is a flexible linker that comprises GS, GGS, GGGGS (SEQ ID NO:43), GGGGGS (SEQ ID NO:41) or combinations thereof, or wherein the peptide linker comprises (GGS)_n, wherein n is 1 to 10; (GGGGS)_n (SEQ ID NO:42), wherein n is 1 to 10; or (GGGGGS)_n (SEQ ID NO:27), wherein n is 1 to 6.

1724. The targeted lipid particle of any of claims 1-9, 15, and 16~~1-13, 22 and 23~~ or the lentiviral vector of any of claims 1014-1623, wherein the G protein or the biologically active portion thereof is a wild-type Nipah virus G (NiV-G) protein or a Hendra virus G protein, or is a functionally active variant or biologically active portion thereof.

~~25. The targeted lipid particle of any of claims 1-13 and 22-24 or the lentiviral vector of any of claims 14-24, wherein the G protein or the biologically active portion thereof is a wild-type NiV-G protein or a functionally active variant or biologically active portion thereof.~~

~~26. The targeted lipid particle or lentiviral vector of claim 24 or claim 25, wherein the NiV-G protein or functionally active variant or biologically active portion thereof comprises the amino acid sequence set forth in SEQ ID NO: 9, SEQ ID NO: 28 or SEQ ID NO:44, or an amino acid sequence having at least at or about 80%, at least at or about 81%, at least at or about 82%, at least at or about 83%, at least at or about 84%, at least at or about 85%, at least at or about 86%, at least at or about 87%, at least at or about 88%, at least at or about 89%, at least at or about 90%, at least at or about 91%, at least at or about 92%, at least at or about 93%, at least at or about 94%, at least at or about 95%, at or about 96%, at least at or about 97%, at least at or about 98%, or at least at or about 99% sequence identity to SEQ ID NO:9, SEQ ID NO:28 or SEQ ID NO:44.~~

~~27. —The targeted lipid particle or lentiviral particle of any of claims 24-26, wherein the NiV-G protein is a biologically active portion that is truncated and lacks up to 40 contiguous amino acid residues at or near the N-terminus of the wild-type NiV-G protein (SEQ ID NO:9, SEQ ID NO:28 or SEQ ID NO:44).~~

~~28. —The targeted lipid particle or lentiviral particle of any of claims 24-27, wherein the NiV-G protein is a biologically active portion that is truncated at the N-terminus of wild-type NiV-G and has the sequence set forth in any of SEQ ID NOS: 10-15, 35-40 or 45-50 or an amino acid sequence having at least at or about 80%, at least at or about 81%, at least at or about 82%, at least at or about 83%, at least at or about 84%, at least at or about 85%, at least at or about 86%, at least at or about 87%, at least at or about 88%, at least at or about 89%, at least at or about 90%, at least at or about 91%, at least at or about 92%, at least at or about 93%, at least at or about 94%, at least at or about 95%, at or about 96%, at least at or about 97%, at least at or about 98%, or at least at or about 99% sequence identity to SEQ ID NOS: 10-15, 35-40 or 45-50.~~

~~29. —The targeted lipid particle or lentiviral vector of any of claims 24-28, wherein the NiV-G protein is a biologically active portion that has a truncation at or near the N-terminus of the wild-type NiV-G selected from the group consisting of a 5-amino acid truncation at or near the N-terminus of the wild-type NiV-G protein, a 10-amino acid truncation at or near the N-terminus of the wild-type NiV-G protein, a 15-amino acid truncation at or near the N-terminus, a 20-amino acid truncation at or near the N-terminus of the wild-type NiV-G protein, a 25-amino acid truncation at or near the N-terminus of the wild-type NiV-G protein, a 30-amino acid truncation at or near the N-terminus of the wild-type NiV-G protein, or a 34-amino acid truncation at or near the N-terminus of the wild-type NiV-G protein, optionally wherein the wild-type NiV-G protein is set forth in SEQ ID NO:9, SEQ ID NO:28 or SEQ ID NO:44.~~

~~30. —The targeted lipid particle or lentiviral vector of any of claims 24-29, wherein the NiV-G protein is a biologically active portion that has a 34-amino acid truncation at or near the N-terminus of the wild-type NiV-G protein (SEQ ID NO:9, SEQ ID NO:28 or SEQ ID NO:44).~~

1834. The targeted lipid particle of any of claims 1-9 and 15-17~~1-13, and 22-30~~ or the lentiviral vector of any of claims 104-173~~104-1730~~, wherein the G-protein or the biologically active portion thereof is a mutant NiV-G protein that exhibits reduced binding to Ephrin B2 or Ephrin B3.

1932. The targeted lipid particle or lentiviral vector of claim 1831, wherein the mutant NiV-G protein comprises:

one or more amino acid substitutions corresponding to amino acid substitutions selected from the group consisting of E501A, W504A, Q530A and E533A with reference to numbering set forth in SEQ ID NO:28.

~~33. The targeted lipid particle or lentiviral vector of claim 31 or claim 32, wherein the mutant NiV-G protein comprises:~~

~~amino acid substitutions E501A, W504A, Q530A and E533A with reference to numbering set forth in SEQ ID NO:28.~~

2034. The targeted lipid particle or lentiviral vector of claim 18 or claim 19~~any of claims 31-33~~, wherein the mutant NiV-G protein or the biologically active portion has the amino acid sequence set forth in SEQ ID NO: 16 or an amino acid sequence having at or about 80%, at least at or about 81%, at least at or about 82%, at least at or about 83%, at or about 84%, at least at or about 85%, at least at or about 86%, or at least at or about 87%, at least at or about 88%, or at least at or about 89%, at least at or about 90%, at least at or about 91%, at least at or about 92%, at least at or about 93%, at least at or about 94%, at least at or about 95%, at or about 96%, at least at or about 97%, at least at or about 98%, or at least at or about 99% sequence identity to SEQ ID NO:16.

2135. The targeted lipid particle of any of claims 1-9 and 15-201-13, and 22-34 or the lentiviral vector of any of claims 1014-2034, wherein the F protein or the biologically active portion thereof is a wild-type Nipah virus F (NiV-F) protein or a Hendra virus F protein or is a functionally active variant or biologically active portion thereof.

~~36. The targeted lipid particle of any of claims 1-13, and 22-35 or the lentiviral vector of any of claims 14-35, wherein the F protein or the biologically active portion thereof is a wild-type NiV-F protein or a functionally active variant or a biologically active portion thereof.~~

~~37. The targeted lipid particle of any of claims 1-13, and 22-36 or the lentiviral vector of any of claims 14-36, wherein the NiV-F protein or the functionally active variant or biologically active portion thereof comprises the amino acid sequence set forth in SEQ ID NO: 2, or an amino acid sequence having at or about 80%, at least at or about 81%, at least at or about 82%, at least at or about 83%, at or about 84%, at least at or about 85%, at least at or about 86%, or at least at or about 87%, at least at or about 88%, or at least at or about 89%, at least at or about 90%, at least at or about 91%, at least at or about 92%, at least at or about 93%, at least at or about 94%, at least at or about 95%, at or~~

~~about 96%, at least at or about 97%, at least at or about 98%, or at least at or about 99% sequence identity to SEQ ID NO: 2.~~

~~38. — The targeted lipid particle of any of claims 1-13, and 22-37 or the lentiviral vector of any of claims 14-37, wherein the NiV-F protein is a biologically active portion thereof that comprises:~~

- ~~i) a 20 amino acid truncation at or near the C-terminus of the wild-type NiV-F protein (SEQ ID NO:2); and/or~~
- ~~ii) a point mutation on an N-linked glycosylation site.~~

~~39. — The targeted lipid particle or lentiviral vector of claim 38, wherein the NiV-F protein or the biologically active portion has the sequence set forth in SEQ ID NO:5 or SEQ ID NO:7 or an amino acid sequence having at or about 80%, at least at or about 81%, at least at or about 82%, at least at or about 83%, at or about 84%, at least at or about 85%, at least at or about 86%, or at least at or about 87%, at least at or about 88%, or at least at or about 89%, at least at or about 90%, at least at or about 91%, at least at or about 92%, at least at or about 93%, at least at or about 94%, at least at or about 95%, at or about 96%, at least at or about 97%, at least at or about 98%, or at least at or about 99% sequence identity to SEQ ID NO: 5 or SEQ ID NO: 7.~~

2240. The targeted lipid particle of any of claims 1-9 and 15-211-13, and 22-37 or the lentiviral vector of any of claims 1014-2137, wherein the NiV-F protein is a biologically active portion thereof that has a 22 amino acid truncation at or near the C-terminus of the wild-type NiV-F protein (SEQ ID NO:2).

2341. The targeted lipid particle or lentiviral vector of claim 2240, wherein the NiV-F protein or the biologically active portion has the sequence set forth in SEQ ID NO:8 or SEQ ID NO:23 or an amino acid sequence that is encoded by a sequence of nucleotides encoding a sequence having at or about 80%, at least at or about 81%, at least at or about 82%, at least at or about 83%, at or about 84%, at least at or about 85%, at least at or about 86%, or at least at or about 87%, at least at or about 88%, or at least at or about 89%, at least at or about 90%, at least at or about 91%, at least at or about 92%, at least at or about 93%, at least at or about 94%, at least at or about 95%, at or about 96%, at least at or about 97%, at least at or about 98%, or at least at or about 99% sequence identity to SEQ ID NO: 8 or SEQ ID NO:23.

2442. The targeted lipid particle of any of claims 1-9 and 15-231-13, and 22-41 or the lentiviral vector of any of claims 1014-2341, wherein the F protein comprises the sequence set forth in SEQ ID NO:23 and the G protein comprises the sequence set forth in SEQ ID NO:16.

~~43. The targeted lipid particle of any of claims 1-13, and 22-42, wherein the lipid bilayer is derived from a membrane of a host cell used for producing a retrovirus or retrovirus-like particle.~~

~~44. The targeted lipid particle of claim 43, wherein the host cell is selected from the group consisting of CHO cells, BHK cells, MDCK cells, C3H 10T1/2 cells, FLY cells, Psi 2 cells, BOSC 23 cells, PA317 cells, WEHI cells, COS cells, BSC 1 cells, BSC 40 cells, BMT 10 cells, VERO cells, W138 cells, MRC5 cells, A549 cells, HT1080 cells, 293 cells, 293T cells, B 50 cells, 3T3 cells, NIH3T3 cells, HepG2 cells, Saos 2 cells, Huh7 cells, HeLa cells, W163 cells, 211 cells, and 211A cells.~~

~~45. The targeted lipid particle of any of claims 1-13, and 22-44, wherein the lipid bilayer is or comprises a viral envelope.~~

~~46. The targeted lipid particle of any of claims 1-13 and 22-45, wherein the targeted lipid particle comprises one or more viral components other than the F protein molecule and the G protein.~~

~~47. The targeted lipid particle of claim 46, wherein the one or more viral components are from a retrovirus.~~

~~48. The targeted lipid particle of any of claims 43-47, wherein the retrovirus is a lentivirus or a lentivirus like particle.~~

2549. The targeted lipid particle of any of claims 1-9 and 15-241-13 and 22-48 or the lentiviral vector of any of claims 1014-2442, wherein the lipid particle or lentiviral vector further comprises an exogenous agent.

~~50. The targeted lipid particle or lentiviral vector of claim 49, wherein the exogenous agent is present in the lumen.~~

2654. The targeted lipid particle or lentiviral vector of claim ~~49 or claim 50~~25, wherein the exogenous agent:

~~_____ is a protein or a nucleic acid, optionally wherein the nucleic acid is a DNA or RNA;~~
is a nucleic acid encoding a cargo for delivery to the target cell;
encodes a therapeutic agent or a diagnostic agent;
encodes a membrane protein; or
~~_____ is a nucleic acid comprising a payload gene for correcting a genetic deficiency.~~

~~_____ 52. _____ The targeted lipid particle or lentiviral vector of any of claims 49-51, wherein the exogenous agent is a nucleic acid encoding a cargo for delivery to the target cell.~~

~~_____ 53. _____ The targeted lipid particle or lentiviral vector of any of claims 49-52, wherein the exogenous agent encodes a therapeutic agent or a diagnostic agent.~~

~~_____ 54. _____ The targeted lipid particle or lentiviral vector of any of claims 49-53, wherein the exogenous agent encodes a membrane protein, optionally wherein the membrane protein is an antigen receptor for targeting cells expressed by or associated with a disease or condition.~~

2755. The targeted lipid particle or lentiviral vector of claim 2653, wherein the membrane protein is a chimeric antigen receptor (CAR).

~~_____ 56. _____ The targeted lipid particle or lentiviral vector of any of claims 52-55, wherein the target cell is a T cell.~~

~~_____ 57. _____ The targeted lipid particle or lentiviral vector of any of claims 49-53, wherein the exogenous agent is a nucleic acid comprising a payload gene for correcting a genetic deficiency, optionally a genetic deficiency in the target cell, optionally wherein the genetic deficiency is associated with a liver cell or a hepatocyte.~~

2858. A polynucleotide comprising a nucleic acid sequence encoding:
~~_____ (i) a henipavirus envelope attachment glycoprotein G (G protein) or a biologically active portion thereof and (ii) a single domain antibody (sdAb) variable domain, wherein the sdAb variable domain is attached to the C-terminus of the G protein or the biologically active portion thereof; or~~
_____ (ii) a henipavirus envelope attachment glycoprotein G (G protein) or a biologically active portion thereof and (ii) a binding domain that binds a cell surface molecule selected from the

group consisting of ASGR1, ASGR2, TM4SF5, CD4, CD8, and low density lipoprotein receptor (LDL-R).

~~59. — The polynucleotide of claim 58, wherein the single domain antibody binds a cell surface molecule present on a target cell.~~

~~60. — The polynucleotide of claim 59, wherein the cell surface molecule is a protein, glycan, lipid or low molecular weight molecule.~~

~~61. — The polynucleotide of claim 59 or claim 60, wherein the target cell is selected from the group consisting of tumor-infiltrating lymphocytes, T cells, neoplastic or tumor cells, virus-infected cells, stem cells, central nervous system (CNS) cells, hematopoietic stem cells (HSCs), liver cells or fully differentiated cells.~~

~~62. — The polynucleotide of any of claims 59-61, wherein the target cell is selected from the group consisting of a CD3+ T cell, a CD4+ T cell, a CD8+ T cell, a hepatocyte, a haematopoietic stem cell, a CD34+ haematopoietic stem cell, a CD105+ haematopoietic stem cell, a CD117+ haematopoietic stem cell, a CD105+ endothelial cell, a B cell, a CD20+ B cell, a CD19+ B cell, a cancer cell, a CD133+ cancer cell, an EpCAM+ cancer cell, a CD19+ cancer cell, a Her2/Neu+ cancer cell, a GluA2+ neuron, a GluA4+ neuron, a NKG2D+ natural killer cell, a SLC1A3+ astrocyte, a SLC7A10+ adipocyte, or a CD30+ lung epithelial cell.~~

~~63. The polynucleotide of any claims 59-62, wherein the cell surface molecule or antigen is selected from the group consisting of ASGR1, ASGR2, TM4SF5, CD8, CD4, and low density lipoprotein receptor (LDL-R).~~

~~64. — A polynucleotide comprising a nucleic acid sequence encoding (i) a henipavirus envelope attachment glycoprotein G (G protein) or a biologically active portion thereof and (ii) a binding domain that binds a cell surface molecule selected from the group consisting of ASGR1, ASGR2, TM4SF5, CD4, CD8, and low density lipoprotein receptor (LDL-R).~~

2965. The polynucleotide of claim 2864, wherein the polynucleotide is of (ii) and wherein the binding domain is a single domain antibody (sdAb) or is a single chain variable fragment (scFv).

~~3066.~~ The polynucleotide of claim 28 or claim 29~~any of claims 58-65~~, wherein the nucleic acid sequence is a first nucleic acid sequence and the polynucleotide further comprises a second nucleic acid sequence encoding a henipavirus F protein molecule or a biologically active portion thereof.

~~67.~~ The polynucleotide of claim 66, wherein the polynucleotide comprises an IRES or a sequence encoding a linking peptide between the first and second nucleic acid sequences, optionally, wherein the linking peptide is a self-cleaving peptide or a peptide that causes ribosome skipping, optionally a T2A peptide.

~~68.~~ The polynucleotide of any of claims 58-67, further comprising at least one promoter that is operatively linked to control expression of the nucleic acid, optionally expression of the first nucleic acid sequence and the second nucleic acid sequence.

~~69.~~ The polynucleotide of any of claims 58-68, wherein the sdAb variable domain or the binding domain is attached to the G protein via an encoded peptide linker.

~~70.~~ The polynucleotide of claim 69, wherein the encoded peptide linker comprises up to 65 amino acids in length, optionally 2 to 65 amino acids in length.

~~71.~~ The polynucleotide of claim 69 or claim 70, wherein the encoded peptide linker comprises GS, GGS, GGGGS (SEQ ID NO:43), GGGGGS (SEQ ID NO:41) and combinations thereof, or . wherein the encoded peptide linker comprises (GGS)_n, wherein n is 1 to 10; (GGGGS)_n (SEQ ID NO:42), wherein n is 1 to 10; or (GGGGGS)_n (SEQ ID NO:27), wherein n is 1 to 4.

~~72.~~ The polynucleotide of any of claims 58-71, wherein the encoded G protein is a wild-type Nipah virus G (NiV-G) protein or a Hendra virus G protein or is a functionally active variant or a biologically active portion thereof, optionally wherein the variant is a variant thereof that exhibits reduced binding for the native binding partner.

~~73.~~ The polynucleotide of any of claims 58-72, wherein the encoded G protein is a wild-type NiV-G protein or a functionally active variant or a biologically active portion thereof.

~~74.~~ The polynucleotide of claim 72 or claim 73, wherein the NiV-G protein or functionally active variant or biologically active portion thereof comprises the amino acid sequence set forth in SEQ ID NO:9, SEQ ID NO: 28 or SEQ ID NO: 44 or comprises an amino

acid sequence having at least at or about 80%, at least at or about 81%, at least at or about 82%, at least at or about 83%, at or about 84%, at least at or about 85%, at least at or about 86%, or at least at or about 87%, at least at or about 88%, or at least at or about 89%, at least at or about 90%, at least at or about 91%, at least at or about 92%, at least at or about 93%, at least at or about 94%, at least at or about 95%, at or about 96%, at least at or about 97%, at least at or about 98%, or at least at or about 99% sequence identity to SEQ ID NO: 9, SEQ ID NO:28 or SEQ ID NO: 44.

75. — The polynucleotide of any of claims 72-74, wherein the NiV-G protein is a biologically active portion that is truncated and lacks up to 40 contiguous amino acid residues at or near the N-terminus of the wild-type NiV-G protein (SEQ ID NO:9, SEQ ID NO:28 or SEQ ID NO:44).

76. — The polynucleotide of any of claims 72-75, wherein the NiV-G protein is a biologically active portion that is truncated at the N-terminus of wild-type NiV-G and comprises the sequence set forth in any of SEQ ID NOS: 10-15, 35-40 or 45-50 or an amino acid sequence having at least at or about 80%, at least at or about 81%, at least at or about 82%, at least at or about 83%, at or about 84%, at least at or about 85%, at least at or about 86%, or at least at or about 87%, at least at or about 88%, or at least at or about 89%, at least at or about 90%, at least at or about 91%, at least at or about 92%, at least at or about 93%, at least at or about 94%, at least at or about 95%, at or about 96%, at least at or about 97%, at least at or about 98%, or at least at or about 99% sequence identity to SEQ ID NOS: 10-15, 35-40 or 45-50.

77. — The polynucleotide of any of claims 72-76, wherein the NiV-G protein is a biologically active portion that has a truncation at or near the N-terminus of the wild-type NiV-G selected from the group consisting of a 5-amino acid truncation at or near the N-terminus of the wild-type NiV-G protein, a 10-amino acid truncation at or near the N-terminus of the wild-type NiV-G protein, a 15-amino acid truncation at or near the N-terminus, a 20-amino acid truncation at or near the N-terminus of the wild-type NiV-G protein, a 25-amino acid truncation at or near the N-terminus of the wild-type NiV-G protein, a 30-amino acid truncation at or near the N-terminus of the wild-type NiV-G protein, or a 34-amino acid truncation at or near the N-terminus of the wild-type NiV-G protein, optionally wherein the wild-type NiV-G protein is set forth in SEQ ID NO: 9, SEQ ID NO:28 or SEQ ID NO: 44.

78. — The polynucleotide of any of claims 72-77, wherein the NiV-G protein is a biologically active portion that has a 34-amino acid truncation at or near the N-terminus of the wild-type NiV-G protein (SEQ ID NO:9, SEQ ID NO:28 or SEQ ID NO:44).

~~79. The polynucleotide of any of claims 58-78, wherein the G protein is a mutant NiV-G protein that exhibits reduced binding to Ephrin B2 or Ephrin B3.~~

~~80. The polynucleotide of claim 79, wherein the mutant NiV-G protein comprises: one or more amino acid substitutions corresponding to amino acid substitutions selected from the group consisting of E501A, W504A, Q530A and E533A with reference to numbering set forth in SEQ ID NO:28.~~

~~81. The polynucleotide of claim 79 or claim 80, wherein the mutant NiV-G protein comprises amino acid substitutions E501A, W504A, Q530A and E533A with reference to numbering set forth in SEQ ID NO:28.~~

~~82. The polynucleotide of any of claims 79-81, wherein the mutant NiV-G protein comprises the amino acid sequence set forth in SEQ ID NO: 16 or an amino acid sequence having at least at or about 80%, at least at or about 81%, at least at or about 82%, at least at or about 83%, at or about 84%, at least at or about 85%, at least at or about 86%, or at least at or about 87%, at least at or about 88%, or at least at or about 89%, at least at or about 90%, at least at or about 91%, at least at or about 92%, at least at or about 93%, at least at or about 94%, at least at or about 95%, at or about 96%, at least at or about 97%, at least at or about 98%, or at least at or about 99% sequence identity to SEQ ID NO:16.~~

~~83. The polynucleotide of any of claims 66-82, wherein the F protein or the biologically active portion thereof is a wild-type Nipah virus F (NiV-F) protein or a Hendra virus F protein or is a functionally active variant or biologically active portion thereof.~~

~~84. The polynucleotide of any of claims 66-83, wherein the F protein or the biologically active portion thereof is a wild-type NiV-F protein or a functionally active variant or a biologically active portion thereof.~~

~~85. The polynucleotide of claim 83 or claim 84, wherein the NiV-F protein or the functionally active variant or biologically active portion thereof comprises the amino acid sequence set forth in SEQ ID NO: 2, or an amino acid sequence having at or about 80%, at least at or about 81%, at least at or about 82%, at least at or about 83%, at or about 84%, at least at or about 85%, at least at or about 86%, or at least at or about 87%, at least at or about 88%, or at least at or about 89%, at least at or about 90%, at least at or about 91%, at least at or about 92%, at least at or about 93%, at~~

~~least at or about 94%, at least at or about 95%, at or about 96%, at least at or about 97%, at least at or about 98%, or at least at or about 99% sequence identity to SEQ ID NO: 2.~~

~~86. — The polynucleotide of claim 85 or claim 85, wherein the NiV F protein is a biologically active portion thereof that comprises:~~

- ~~i) a 20 amino acid truncation at or near the C terminus of the wild type NiV F protein (SEQ ID NO:2); and/or~~
- ~~ii) a point mutation on an N-linked glycosylation site.~~

~~87. — The polynucleotide of claim 86, wherein the NiV F protein or the biologically active portion has the sequence set forth in SEQ ID NO:5 or SEQ ID NO:7 or an amino acid sequence having at or about 80%, at least at or about 81%, at least at or about 82%, at least at or about 83%, at or about 84%, at least at or about 85%, at least at or about 86%, or at least at or about 87%, at least at or about 88%, or at least at or about 89%, at least at or about 90%, at least at or about 91%, at least at or about 92%, at least at or about 93%, at least at or about 94%, at least at or about 95%, at or about 96%, at least at or about 97%, at least at or about 98%, or at least at or about 99% sequence identity to SEQ ID NO:5 or SEQ ID NO: 7.~~

~~88. — The polynucleotide of claim 85 or claim 86, wherein the NiV F protein is a biologically active portion thereof that has a 22 amino acid truncation at or near the C terminus of the wild type NiV F protein (SEQ ID NO:2).~~

~~89. — The polynucleotide of claim 88, wherein the NiV F protein or the biologically active portion has the sequence set forth in SEQ ID NO:8 or SEQ ID NO:23 or an amino acid sequence that is encoded by a sequence of nucleotides encoding a sequence having at or about 80%, at least at or about 81%, at least at or about 82%, at least at or about 83%, at or about 84%, at least at or about 85%, at least at or about 86%, or at least at or about 87%, at least at or about 88%, or at least at or about 89%, at least at or about 90%, at least at or about 91%, at least at or about 92%, at least at or about 93%, at least at or about 94%, at least at or about 95%, at or about 96%, at least at or about 97%, at least at or about 98%, or at least at or about 99% sequence identity to SEQ ID NO: 8 or SEQ ID NO:23.~~

~~90. — The polynucleotide of any of claims 66-89, wherein the F protein comprises the sequence set forth in SEQ ID NO:23 and the G protein comprises the sequence set forth in SEQ ID NO:16.~~

3194. A vector, comprising the polynucleotide of any of claims 2858-3090.

~~92. — The vector of claim 91, wherein the vector is a mammalian vector, viral vector or artificial chromosome, optionally wherein the artificial chromosome is a bacterial artificial chromosome (BAC).~~

3293. A plasmid, comprising the polynucleotide of any of claims 2858-3090.

~~94. — The plasmid of claim 93, further comprising one or more nucleic acids encoding proteins for lentivirus production.~~

3395. A cell comprising the polynucleotide of any of claims 2858-3090, or the vector of claim ~~91 or claim~~ 9231, or the plasmid of claim ~~93 or~~ 9432.

3496. A method of making a targeted lipid particle comprising a henipavirus F protein molecule or biologically active portion thereof and a targeted envelope protein comprising a henipavirus envelope attachment glycoprotein G (G protein) or a biologically active portion thereof and a single domain antibody (sdAb) variable domain, the method comprising:

- a) providing a cell that comprises a nucleic acid encoding a henipavirus F protein molecule or biologically active portion thereof and a nucleic acid encoding a targeted envelope protein, the targeted envelope protein comprising a henipavirus envelope attachment glycoprotein G (G protein) or a biologically active portion thereof and a single domain antibody (sdAb) variable domain;
- b) culturing the cell under conditions that allow for production of a targeted lipid particle, and
- c) separating, enriching, or purifying the targeted lipid particle from the cell, thereby making the targeted lipid particle.

3597. A method of making a pseudotyped lentiviral vector, the method comprising:

- a) providing a producer cell that comprises a lentiviral viral nucleic acid(s), a nucleic acid encoding a henipavirus F protein molecule or biologically active portion thereof, and a nucleic acid encoding a targeted envelope protein, said targeted envelope protein comprising a henipavirus envelope attachment glycoprotein G (G protein) or a biologically active portion thereof and a single domain antibody;
- b) culturing the cell under conditions that allow for production of the lentiviral vector, and
- c) separating, enriching, or purifying the lentiviral vector from the cell, thereby making the pseudotyped lentiviral vector.

3698. A method of making a targeted lipid particle comprising a henipavirus F protein molecule or biologically active portion thereof and a targeted envelope protein comprising a henipavirus envelope attachment glycoprotein G (G protein) or a biologically active portion thereof and a binding domain, the method comprising:

a) providing a cell that comprises a nucleic acid encoding a henipavirus F protein molecule or biologically active portion thereof and a nucleic acid encoding a targeted envelope protein, the targeted envelope protein comprising a henipavirus envelope attachment glycoprotein G (G protein) or a biologically active portion thereof and binding domain, wherein the binding domain:

(i) binds a cell surface molecule selected from the group consisting of ASGR1, ASGR2, and TM4SF5, ~~optionally human ASGR1, human ASGR2 and human ASGR2;~~

(ii) binds a cell surface molecule selected from the group consisting of CD4 or CD8, ~~optionally human CD4 or human CD8;~~ or

(iii) binds a cell surface molecule that is low density lipoprotein receptor (LDL-R), ~~optionally human LDL-R;~~

b) culturing the cell under conditions that allow for production of a targeted lipid particle, and
c) separating, enriching, or purifying the targeted lipid particle from the cell, thereby making the targeted lipid particle.

wherein the targeted lipid particle is a pseudotyped lentiviral vector.

~~99. — A method of making a pseudotyped lentiviral vector, the method comprising:
— a) providing a producer cell that comprises a lentiviral viral nucleic acid(s), a nucleic acid encoding a henipavirus F protein molecule or biologically active portion thereof, and a nucleic acid encoding a targeted envelope protein, said targeted envelope protein comprising a henipavirus envelope attachment glycoprotein G (G protein) or a biologically active portion thereof and binding domain, wherein the binding domain:~~

~~— (i) binds a cell surface molecule selected from the group consisting of ASGR1, ASGR2, and TM4SF5, optionally human ASGR1, human ASGR2 and human ASGR2;~~

~~— (ii) binds a cell surface molecule selected from the group consisting of CD4 or CD8, optionally human CD4 or human CD8; or~~

~~— (iii) binds a cell surface molecule that is low density lipoprotein receptor (LDL-R), optionally human LDL-R;~~

~~— b) culturing the producer cell under conditions that allow for production of a lentiviral vector, and~~

~~— c) separating, enriching, or purifying the lentiviral vector from the cell, thereby making the pseudotyped lentiviral vector.~~

~~100. — The method of claim 98 or claim 99, wherein the binding domain is a single domain antibody or is a single chain variable fragment (scFv).~~

~~37101.~~ A method of making a targeted lipid particle comprising a henipavirus F protein molecule or biologically active portion thereof and a targeted envelope protein, comprising:

- a) providing a cell that comprises the polynucleotide of any of claims ~~2858-3090~~, or the vector of claim ~~91 or claim 9231~~, or the plasmid of claim ~~93 or claim 9432~~;
- b) culturing the cell under conditions that allow for production of a targeted lipid particle, and
- c) separating, enriching, or purifying the targeted lipid particle from the cell, thereby making the targeted lipid particle.

~~38102.~~ A method of making a pseudotyped lentiviral vector, comprising:

- a) providing a producer cell that comprises a lentiviral viral nucleic acid(s), and the polynucleotide of any of claims ~~2858-3090~~, or the vector of claim ~~91 or claim 9231~~, or the plasmid of claim ~~3293 or claim 94~~;
- b) culturing the cell under conditions that allow for production of the lentiviral vector, and
- c) separating, enriching, or purifying the lentiviral vector from the cell, thereby making the pseudotyped lentiviral vector.

~~103. — The method of claim 101 or claim 102, wherein prior to step (b) the method further comprises providing the cell a polynucleotide encoding a henipavirus F protein molecule or biologically active portion thereof.~~

~~—— 104. — The method of claim 96-103, wherein the cell is a mammalian cell.~~

~~—— 105. — The method of any of claims 96-104, wherein the cell is a producer cell comprising viral nucleic acid, optionally retroviral nucleic acid or lentiviral nucleic acid, and the targeted lipid particle is a viral particle or a viral-like particle, optionally a retroviral particle or a retroviral-like particle, optionally a lentiviral particle or lentiviral-like particle.~~

~~39106.~~ A producer cell comprising the polynucleotide of any of claims ~~2858-3090~~, or the vector of claim ~~3191 or claim 92~~, or the plasmid of claim ~~93 or claim 9432~~.

~~40107.~~ The producer cell of claim ~~39106~~, further comprising nucleic acid encoding a henipavirus F protein or a biologically active portion thereof.

~~108. The producer cell of claim 106 or claim 107, wherein the cell further comprises a viral nucleic acid, optionally wherein the viral nucleic acid is a lentiviral nucleic acid.~~

~~41109. A producer cell comprising (i) a viral nucleic acid(s) and (ii) nucleic acid encoding a henipavirus F protein molecule or biologically active portion thereof and (iii) a nucleic acid encoding a targeted envelope protein comprising a henipavirus envelope attachment glycoprotein G (G protein) or a biologically active portion thereof and a single domain antibody (sdAb) variable domain, optionally wherein the viral nucleic acid(s) are lentiviral nucleic acids.~~

~~110. The producer cell of claim 109, wherein the single domain antibody binds a cell surface molecule present on a target cell.~~

~~111. The producer cell of claim 110, wherein the cell surface molecule is a protein, glycan, lipid or low molecular weight molecule.~~

~~112. The producer cell of claim 110 or claim 111, wherein the target cell is selected from the group consisting of tumor-infiltrating lymphocytes, T cells, neoplastic or tumor cells, virus-infected cells, stem cells, central nervous system (CNS) cells, hematopoietic stem cells (HSCs), liver cells or fully differentiated cells.~~

~~113. The producer cell of any of claims 110-112, wherein the target cell is selected from the group consisting of a CD3+ T cell, a CD4+ T cell, a CD8+ T cell, a hepatocyte, a haematopoietic stem cell, a CD34+ haematopoietic stem cell, a CD105+ haematopoietic stem cell, a CD117+ haematopoietic stem cell, a CD105+ endothelial cell, a B cell, a CD20+ B cell, a CD19+ B cell, a cancer cell, a CD133+ cancer cell, an EpCAM+ cancer cell, a CD19+ cancer cell, a Her2/Neu+ cancer cell, a GluA2+ neuron, a GluA4+ neuron, a NKG2D+ natural killer cell, a SLC1A3+ astrocyte, a SLC7A10+ adipocyte, or a CD30+ lung epithelial cell.~~

~~42114. A producer cell comprising (i) a viral nucleic acid(s) and (ii) nucleic acid encoding a henipavirus F protein molecule or biologically active portion thereof and (iii) a nucleic acid encoding a targeted envelope protein comprising a henipavirus envelope attachment glycoprotein G (G protein) or a biologically active portion thereof and a binding domain, wherein the binding domain:~~

~~(i) binds a cell surface molecule selected from the group consisting of ASGR1, ASGR2, and TM4SF5, optionally human ASGR1, human ASGR2 and human ASGR2;~~

~~(ii) binds a cell surface molecule selected from the group consisting of CD4 or CD8, optionally human CD4 or human CD8; or~~

(iii) binds a cell surface molecule that is low density lipoprotein receptor (LDL-R);
~~optionally human LDL-R;~~
~~optionally wherein the viral nucleic acid(s) are lentiviral nucleic acid.~~

~~115. The producer cell of claim 114, wherein the binding domain is a single domain antibody or is a single chain variable fragment.~~

~~116. The producer cell of any of claims 109-115, wherein the F protein or the biologically active portion thereof is a wild-type Nipah virus F (NiV-F) protein or a Hendra virus F protein or is a functionally active variant or biologically active portion thereof.~~

~~117. The producer of any of claims 109-116, wherein: the F protein or the biologically active portion thereof is a wild-type NiV-F protein or a functionally active variant or a biologically active portion thereof.~~

~~118. The producer cell of any of claims 109-117, wherein the henipavirus F protein molecule or biologically active portion thereof comprises:~~

~~(i) the sequence set forth in SEQ ID NO: 2, SEQ ID NO:5, SEQ ID NO:7, SEQ ID NO: 8 or SEQ ID NO:23;~~

~~(ii) an amino acid sequence having at or about 80%, at least at or about 81%, at least at or about 82%, at least at or about 83%, at or about 84%, at least at or about 85%, at least at or about 86%, or at least at or about 87%, at least at or about 88%, or at least at or about 89%, at least at or about 90%, at least at or about 91%, at least at or about 92%, at least at or about 93%, at least at or about 94%, at least at or about 95%, at least at or about 96%, at least at or about 97%, at least at or about 98%, or at least at or about 99% sequence identity to SEQ ID NO:2, SEQ ID NO:5, SEQ ID NO:7, SEQ ID NO: 8 or SEQ ID NO:23.~~

~~119. The producer cell of any of claims 109-118, wherein the encoded G protein is a wild-type Nipah virus G (NiV-G) protein or a Hendra virus G protein or is a functionally active variant or a biologically active portion thereof, optionally wherein the variant is a variant thereof that exhibits reduced binding for the native binding partner.~~

~~120. The producer cell of any of claims 109-119, wherein the encoded G protein is a wild-type NiV-G protein or a functionally active variant or a biologically active portion thereof.~~

~~121. The producer cell of any of claims 109-120, wherein the henipavirus envelope attachment glycoprotein G (G protein) or a biologically active portion thereof comprises:~~

~~(i) the sequence set forth in SEQ ID NO: 9, SEQ ID NO:28 or SEQ ID NO:44;~~

~~(ii) an amino acid sequence having at or about 80%, at least at or about 81%, at least at or about 82%, at least at or about 83%, at or about 84%, at least at or about 85%, at least at or about 86%, or at least at or about 87%, at least at or about 88%, or at least at or about 89%, at least at or about 90%, at least at or about 91%, at least at or about 92%, at least at or about 93%, at least at or about 94%, at least at or about 95%, at least at or about 96%, at least at or about 97%, at least at or about 98%, or at least at or about 99% sequence identity to SEQ ID NO: 9, SEQ ID NO:28 or SEQ ID NO:44.~~

~~122. The producer cell of any of claims 109-121, wherein the henipavirus envelope attachment glycoprotein G (G protein) or a biologically active portion thereof comprises:~~

~~(i) the sequence set forth in SEQ ID NO: 10-16, 35-40 or 45-51;~~

~~(ii) an amino acid sequence having at least at or about 80%, at least at or about 81%, at least at or about 82%, at least at or about 83%, at or about 84%, at least at or about 85%, at least at or about 86%, or at least at or about 87%, at least at or about 88%, or at least at or about 89%, at or about 90%, at least at or about 91%, at least at or about 92%, at least at or about 93%, at least at or about 94%, at least at or about 95%, at least at or about 96%, at least at or about 97%, at least at or about 98%, or at least at or about 99% sequence identity to SEQ ID NO: 10-16, 35-40 or 45-51.~~

~~123. The producer cell of any one of claims 109-122, wherein:~~

~~the producer cell has greater membrane (e.g., plasma membrane) expression of the targeted envelope protein compared to a reference producer cell that has incorporated into its membrane (e.g. plasma membrane) the same envelope protein but that is fused to an alternative targeting moiety, optionally wherein the alternative targeting moiety is a single chain variable fragment (scFv); and/or~~

~~the producer cell has the expression of the targeted envelope protein on a membrane (e.g., plasma membrane) of the producer cell is at least 20 proteins (e.g., at least 50, 100, 200, 500, 1000, 2000, 5000, or 10,000 proteins) per square micron; and/or the targeted envelope protein comprises at least 0.1% (e.g., at least 0.2%, 0.5%, 1%, 2%, 3%, 4%, 5%, 6%, 7%, 8%, 9%, or 10%) of the total membrane (e.g., plasma membrane) proteins of the producer cell (e.g., by total protein weight).~~

43124. A targeted lipid particle or pseudotyped lentiviral vector produced by the method of any of claims 3496-38105 or from the producer cell of any of claims 39106-42122.

~~125. The targeted lipid particle of any of claims 1-13, 21-57 and 124, wherein the targeted lipid particle has greater expression of the targeted envelope protein compared to a reference lipid particle that has incorporated into a similar lipid bilayer the same envelope protein but that is fused to an alternative targeting moiety, optionally wherein the alternative targeting moiety is a single chain variable fragment (scFv).~~

~~126. The targeted lipid particle of any of claims 1-13, 21-57, 124 and 125, the lentiviral vector of any of claims 13-42, 49-57 and 124, wherein:~~

~~the titer in target cells following transduction is at or greater than 1×10^6 transduction units (TU)/mL, at or greater than 2×10^6 TU/mL, at or greater than 3×10^6 TU/mL, at or greater than 4×10^6 TU/mL, at or greater than 5×10^6 TU/mL, at or greater than 6×10^6 TU/mL, at or greater than 7×10^6 TU/mL, at or greater than 8×10^6 TU/mL, at or greater than 9×10^6 TU/mL, or at or greater than 1×10^7 TU/mL; and/or~~

~~the targeted envelope protein is present on the surface of the targeted lipid particle at a density of at least about (0.001, 0.002, 0.005, 0.01, 0.02, 0.05, 0.1, 0.2 or 0.5) targeted envelope proteins/nm².~~

44127. A composition comprising a plurality of targeted lipid particles of any one of claims 1-9, 12-27, and 43 or a ~~a~~ plurality of lentiviral vectors of any of claims 10-27 and 43~~1-57 and 124-126.~~

~~128. The composition of claim 127 further comprising a pharmaceutically acceptable carrier.~~

~~129. The composition of claim 127 or claim 128, wherein:~~

~~among the population of lipid particles or lentiviral vectors in the composition, greater than at or about 50%, greater than at or about 55%, greater than at or about 60%, greater than at or about 65%, greater than at or about 70%, or greater than at or about 75% are surface positive for the targeted envelope protein; and/or~~

~~the targeted envelope protein is present on the surface of the targeted lipid particles at an average density of at least about (0.001, 0.002, 0.005, 0.01, 0.02, 0.05, 0.1, 0.2 or 0.5) targeted envelope proteins/nm².~~

45130. A method of transducing a cell comprising transducing a cell with a lentiviral vector of any of claims 9-27 and 43~~13-42, 49-57 and 124~~ or a composition comprising a lentiviral vector or plurality of lentiviral vectors of any of claims 9-27 and 43~~13-42, 49-57 and 124.~~

~~131. —The method of claim 130, wherein:~~
~~the targeted envelope protein of the lentiviral vector or targeted lipid particle targets~~
~~CD4 and the cell is a CD4+ cell; or~~
~~the targeted envelope protein of the lentiviral vector targets CD8 and the cell is a CD8+~~
~~cell; or~~
~~the targeted envelope protein of the lentiviral vector targets ASGR1, ASGR2 or TM4SF5~~
~~and the cell is a hepatocyte.~~

~~46132. A method of delivering an exogenous agent to a subject (e.g., a human subject), the~~
~~method comprising administering to the subject~~Use of
~~the targeted lipid particle or lentiviral vector of~~
~~any of claims 25-2749-57, 125 and 126, in the manufacture of a medicament for delivering an~~
~~exogenous agent to a subject, wherein the~~ targeted lipid particle or lentiviral vector comprises s the
exogenous agent.

~~47133. A method of delivering an exogenous agent to a subject (e.g., a human subject), the~~
~~method comprising administering to the subject~~Use of
~~the composition of claim 44any of claims 127-~~
~~129, in the manufacture of a medicament for delivering an exogenous agent to a subject, wherein the~~
targeted lipid particles s or lentiviral vectors of the plurality comprise the exogenous agent.

~~48134. A method of delivering a chimeric antigen receptor (CAR) to a cell, comprising~~
~~contacting a cell with the lentiviral vector of any of claims 10 and 12-2414-16 and 19-42 or a~~
~~targeted lipid particle of claim 55 or claim 5627, wherein the lentiviral vector or targeted lipid particle~~
comprises s a nucleic acid encoding the CAR.

~~49135. A method of delivering a chimeric antigen receptor (CAR) to a cell, comprising~~
~~contacting a cell with the composition of claim 44any of claims 127-129, wherein the~~ lentiviral
vectors or the targeted lipid particles of the plurality comprise a nucleic acid encoding the CAR.

~~50136. A method of delivering an exogenous agent to a hepatocyte, comprising~~
~~contacting a cell with the lentiviral vector of any of claims 1117-2442 or a targeted lipid particle~~
~~or lentiviral vector of claim 5726, wherein the exogenous agent is a nucleic acid comprising a payload~~
~~gene for correcting a genetic deficiency.~~

~~51137. A method of delivering an exogenous agent to a hepatocyte, comprising~~
~~contacting a cell with the composition of claim 44any of claims 127-129, wherein the~~ lentiviral

vectors or the targeted lipid particles of the plurality comprise an exogenous agent for delivery to the hepatocyte.

~~138. The method of any of claims 134-137, wherein the contacting transduces the cell with lentiviral vector or the targeted lipid particle, optionally wherein the contacting is in vivo in a subject.~~

~~53139. A method of treating a disease or disorder in a subject (e.g., a human subject), the method comprising administering to the subject Use of a targeted lipid particle of any of claims 1-9, 14-27, and 43, 1-13, 21-57, and 124-126 or the lentiviral vector of any of claims 9-27 and 43, 13-42, 49-57, 124 and 126, or the composition of claim 44 any of claims 127-129, in the manufacture of a medicament for treating a disease or disorder in a subject.~~

~~53140. A method of fusing a mammalian cell to a targeted lipid particle, the method comprising administering to the subject Use of a targeted lipid particle of any of claims 1-9, 14-27, and 43, 1-13, 21-57, and 124-126, the lentiviral vector of any of claims 9-27 and 43, 13-42, 49-57, 124 and 126 or the composition of claim 44 any of claims 127-129, in the manufacture of a medicament for fusing a mammalian cell to a targeted lipid particle in a subject.~~

~~54141. The method-use of claim 53140, wherein the fusing of the mammalian cell to the targeted lipid particle delivers an exogenous agent to a-the subject (e.g., a human subject).~~

55. A targeted lipid particle of any one of claims 1-9, 14-27, and 43, or a lentiviral vector of any one of claims 9-27 and 43, for use in treating a disease or disorder in a subject.

56. A targeted lipid particle of any one of claims 1-9, 14-27, and 43, or a lentiviral vector of any one of claims 9-27 and 43, for use in fusing a mammalian cell to a targeted lipid particle in a subject.

57. A targeted lipid particle of any one of claims 1-9, 14-27, and 43, or a lentiviral vector of any one of claims 9-27 and 43, for use in delivering an exogenous agent to a subject, wherein the targeted lipid particle or lentiviral vector comprises the exogenous agent.

58. A composition of claim 44, for use in delivering an exogenous agent to a subject, wherein the targeted lipid particles or lentiviral vectors of the plurality comprise the exogenous agent.